IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. 10/775,979

Applicant: ZHU et al.

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DECLARATION UNDER 37 C.F.R. § 1.132 FROM LINFANG ZHU, PH.D.

I, Linfang Zhu, hereby declare that:

1. I am a co-inventor of the above-identified application and I am familiar with the application and the pending claims. Claims 1, 3-5, 10, 12-13, 15, 17-20, and 22 stand rejected under 35 U.S.C. § 102(e), as allegedly anticipated by Zou et al. (USP 6,726,756). Claims 2, 6-9, 11, 14, 16, and 21 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Zou et al.

2. I obtained a B.S. degree in 1985 in Chemical and Polymer Engineering from Tsinghua University in Bejing, China, and a Ph.D. degree in 1991 in Polymer Science from the University of Akron in Akron, Ohio. I was a post-doctoral research associate at the University of Chicago in Chicago, Illinois, from 1991 to 1992 and at Northern Illinois University, DeKalb, Illinois, from 1993 to 1994. I have been with Videojet Technologies Inc. (or its predecessor) in Wood Dale, Illinois, since 1994, and my present title is Lead Chemist. My areas of expertise include developing ink jet ink compositions.

3. Independent claims 1-3 have been amended as discussed in the accompanying Reply to Office Action. The presently claimed invention has superior properties compared to the ink composition of Zou et al., as discussed below.

4. Ink jet ink compositions in accordance with the presently claimed invention were prepared and compared with ink jet ink compositions of Zou et al. The ink jet ink compositions of the present invention provide shorter ink dry times and greater adhesion to substrates (rub resistance and scratch resistance) than the ink jet ink compositions of Zou et al.

5. In Table 1 below, Sample Nos. 3 and 4 correspond to ink jet ink compositions of the presently claimed invention illustrated in Examples 4 and 2, respectively, of the patent application. Sample No. 3 contains a rosin resin and methyl ethyl ketone, is free of cellulose nitrate resin, and is therefore, an embodiment of independent claim 3. Sample No. 4 contains methyl ethyl ketone, a rosin resin, and a vinyl resin (co-binder resin), and is therefore, an embodiment of independent claims 1-2. Sample No. 1 corresponds to Ink Formulation No. 2 of Zou et al. and contains a polyketone resin, a rosin resin, and 1-methoxy-2-propanol. Sample No. 2 contains a rosin resin, a cellulose nitrate resin, 1-methoxy-2-propanol, and N-methyl pyrrolidone. 1-Methoxy-2-propanol and N-methyl pyrrolidone are slow evaporating solvents. Sample No. 2 corresponds to In Formulation No. 4 of Zou et al., except that the polyketone resin has been replaced with a rosin resin in order to compare the effect of the combination of slow evaporating solvents, a rosin resin, and nitrocellulose vs. a combination having methyl ethyl ketone and rosin resin (and free of nitrocellulose) as in claim 3.

6. Codes were ink jet printed on various substrates indicated in Table 1 BOPP1, BOPP2 and BOPP3 represent biaxially oriented polypropylene from three different sources. LDPE represents low density polyethylene. PP represents polypropylene. PTFE represents polytetrafluoroethylene. Rub resistance was determined by the number of thumb rubs needed to remove the codes. Scratch resistance was determined by the number of fingernail scratches needed to remove the codes.

Table 1. Ink Formulations and Test Results

1. Ink formulation (wt. %)		Sample No. 1	Sample No. 2	Sample No. 3	Sample No. 4
1-Methoxy-2-propanol		83	78.4		
N-Methyl pyrrolidone			7		
D. I. Water		2	1		
Krumbhaar 1717H, Polyketone Resin		6			
Krumbhaar 3107, a phenolic modified rosin resin		0.5	4		
Nitrocellulose 18/25 cps			0.8		
Lithium trifluoromethanesulfonate (FC-122)		2			
Lithium Nitrate			1.8		
Methyl Ethyl Ketone				61.5	80.7
Staybelite Ester 10 (rosin ester)				30	10
Bakelite VMCH (vinyl resin)					3.3
Santicizer 160 (plasticizer)			0.5		1
Silwet L-7622 (wetting agent)		2	2	0.5	0.5
Orasol Black RLI (solvent black 29)		4.5	4.5	8	4.5
TOTAL		100	100	100	100
2. Testing and results	Substrate				
Dry time (second)	BOPP 1	7	13	4	2
	BOPP 2	7	12	4	2
	BOPP 3	7	12	4	2
	LDPE	8	16	4	2
	PP	7	15	4	2
	PTFE	9	17	5	3
Rub resistance at 1 minute after print	BOPP 1	9	1	6	>10
	BOPP 2	4	1	6	>10
	BOPP 3	7	1	5	>10
	LDPE	2	1	7	>10
	PP	2	1	7	>10
	PTFE	1	1	5	10
Scratch resistance at 1 minute after print	BOPP 1	1	1	5	>10
	BOPP 2	1	1	5	>10
	BOPP 3	1	1	5	>10
	LDPE	1	1	5	8
	PP	1	1	2	6
	PTFE	1	1	1	2
Scratch resistance at 1 hour after print	BOPP 1	1	1	8	>10
	BOPP 2	1	1	10	>10
	BOPP 3	1	1	7	>10
	LDPE	1	1	5	8
	PP	1	1	2	6
	PTFE	1	1	1	2

7. As can be seen from the data set forth in Table 1, the dry times for the ink jet ink compositions of the presently claimed invention were shorter than those of Zou et al. ink compositions. Further, surprisingly, the rub resistance and the scratch resistance of the codes printed from the ink jet ink composition of the presently claimed invention were higher than those of Zou et al. ink compositions.

8. I hereby declare that all statements made herein of my own knowledge are true, that all statements made on information and belief are believed to be true, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

6-30-2005
Date

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